

What is claimed is:

1. An exercise device which comprises:

a first arm having a first end and a second end;

a second arm having a first end and a second end;

5 a joint assembly defining an axis of rotation, said first end of said first arm being attached to said joint assembly to establish a fixed relationship between said first arm and said axis, with said first end of said second arm being pivotally attached to said joint assembly for rotation of said second arm about said axis in a first direction and in a second direction;

10 a means attached to said second end of said first arm for stabilization of said first arm; and

a means mounted on said joint assembly for establishing a resistance to said rotation of said second arm.

15 2. An exercise device as recited in claim 1 wherein said resistance means comprises:

a shaft mounted on said joint assembly and fixedly interconnected with said second arm;

a one-way clutch engageable with said shaft;

20 a cone member engaged with said one-way clutch for free rotation of said second arm relative to said cone member around said axis in said second direction, and for rotation of said second arm with said cone member around said axis in said first direction, said cone member having a surface; and

25 a cup member fixedly attached to said first arm, said cup member having a surface dimensioned for a mating engagement with said surface of said cone member at an interface therebetween to establish said resistance to said rotation of said second arm.

3. An exercise device as recited in claim 2 further comprising:  
a plunger;  
a force transfer mechanism positioned between said plunger  
and said cone member; and

5 a knob mounted on said cup member and connected to said  
plunger, said knob being rotatable to selectively move said plunger  
relative to said cone member to activate said force transfer mechanism  
and urge said surface of said cone member against said surface of  
said cup member to establish said resistance.

10 4. An exercise device as recited in claim 2 wherein said surface of  
said cone member is tapered, and wherein said surface of said cup member  
is tapered.

5. An exercise device as recited in claim 3 wherein said force  
transfer mechanism comprises:

15 a spring; and  
a thrust bearing to allow relative motion between said plunger  
and said cone member.

6. An exercise device as recited in claim 3 further comprising at  
least one spring-loaded detent, said spring-loaded detent being mounted on  
20 said cup member to urge against said knob to provide an aural signal in  
response to rotation of said knob.

7. An exercise device as recited in claim 2 wherein said cup member is formed with an annular groove, said groove being centered on said axis of rotation and lying in a plane substantially perpendicular thereto, and wherein said device further comprises a guide pin, said guide pin being  
5 mounted on said second arm for insertion into said groove to interconnect said second arm with said joint assembly.

8. An exercise device as recited in claim 2 further comprising a friction liner positioned at said interface between said surface of said cone member and said surface of said cup member.

10 9. An exercise device as recited in claim 1 wherein said stabilizing means is a foot pedal.

10. An exercise device as recited in claim 1 further comprising a handle attached to said second end of said second arm.

15 11. An exercise device as recited in claim 10 wherein said handle can be selectively oriented relative to said second arm.

12. An exercise device as recited in claim 1 further comprising:  
a load sensor mounted on said device to generate signals representative of the magnitude of said resistance to said rotation of said second arm; and  
20 a means for monitoring said signals.

13. An exercise device which comprises:

a first arm having a first end and a second end;

a second arm having a first end and a second end;

a joint assembly defining an axis of rotation, said first end of said first arm being attached to said joint assembly to establish a fixed relationship between said first arm and said axis, with said first end of said second arm being pivotally attached to said joint assembly for rotation of said second arm about said axis in a first direction and in a second direction;

a one-way clutch mounted on said joint assembly to interconnect said clutch with said second arm;

a cone member engaged with said one-way clutch for free rotation of said second arm relative to said cone member around said axis in said second direction, and for rotation of said second arm with said cone member around said axis in said first direction, said cone member having a surface; and

a cup member fixedly attached to said first arm, said cup member having a surface dimensioned for a mating engagement with said surface of said cone member at an interface therebetween to establish a resistance to said rotation of said second arm.

14. An exercise device as recited in claim 13 further comprising a foot pedal attached to said second end of said first arm for stabilization of said first arm.

15. An exercise device as recited in claim 13 wherein said surface of said cone member is tapered, and wherein said surface of said cup member is tapered.

16. An exercise device as recited in claim 13 wherein said device further comprises:

a plunger;

a force transfer mechanism positioned between said plunger  
5 and said cone member; and

a knob mounted on said cup member and connected to said  
plunger, said knob being rotatable to selectively move said plunger  
relative to said cone member to activate said force transfer mechanism  
and urge said tapered surface of said cone member against said  
10 tapered surface of said cup member to establish said resistance.

17. An exercise device as recited in claim 16 wherein said force transfer mechanism is a spring.

18. An exercise device as recited in claim 13 further comprising:

a position sensor mounted on said device to generate signals  
15 representative of relative positions of said first arm and said second  
arm for said device; and

a means for monitoring said signals.

19. An exercise device as recited in claim 13 wherein said cup  
member is formed with an annular groove, said groove being centered on said  
20 axis of rotation and lying in a plane substantially perpendicular thereto, and  
wherein said device further comprises a means for interconnecting said  
second arm with said joint assembly.

20. An exercise device as recited in claim 13 further comprising a  
friction liner positioned at said interface between said surface of said cone  
25 member and said surface of said cup member.

21. A method for using an exercise device which comprises the steps of:

5 providing an exercise device including a first arm having a first end and a second end, a second arm having a first end and a second end, a joint assembly defining an axis of rotation, said first end of said first arm being attached to said joint assembly to establish a fixed relationship between said first arm and said axis, with said first end of said second arm being pivotally attached to said joint assembly for rotation of said second arm about said axis in a first direction and in a second direction;

10 establishing a resistance to said rotation of said second arm in said first direction; and

stabilizing said exercise device at said second end of said first arm of said exercise device.

15 22. A method as recited in claim 21 wherein said establishing step is accomplished using a resistance means which comprises a one-way clutch mounted on said joint assembly and fixedly interconnected with said second arm, a cone member engaged with said one-way clutch for free rotation of said second arm relative to said cone member around said axis in said second direction, and for rotation of said second arm with said cone member around said axis in said first direction, said cone member having a surface, and a cup member fixedly attached to said first arm, said cup member having a surface dimensioned for a mating engagement with said surface of said cone member at an interface therebetween to establish said resistance to said rotation of said second arm in said first direction.

23. A method as recited in claim 22 wherein said surface of said cone member is tapered, and wherein said surface of said cup member is tapered.

24. A method as recited in claim 22 wherein said resistance means further comprises a plunger, a force transfer mechanism positioned between said plunger and said cone member, and a knob mounted on said cup member and connected to said plunger, said knob being rotatable to  
5 selectively move said plunger relative to said cone member to activate said force transfer mechanism and urge said surface of said cone member against said surface of said cup member to establish said resistance.

25. A method as recited in claim 21 further comprising the steps of:  
mounting a position sensor onto said device to generate signals  
10 representative of relative positions of said first arm and said second arm for said device; and  
monitoring said signals.